3-Way Decoking Valve Option - Installation and Operation Instructions

Accessory G6600-60058

Background

Accumulation of contaminants, such as column bleed, impurities in detector gases and even carbon from samples, can cause the performance of the Model 355 burner to change. Only clean gases should be used in the system, and gas chromatograph (GC) operating conditions should be chosen to avoid excessive column bleed. Large sample sizes should also be avoided. Nevertheless, even under ideal operating conditions, certain hydrocarbons possess the propensity to form carbon in the burner and cause a decline in detector response. Carbon, and some other contaminants, can be removed by simultaneously turning off the hydrogen and turning on oxygen to the burner for a few minutes. The option consists of a 3-way solenoid valve that is installed in the hydrogen line between the Model 355 controller and the Model 355 burner. An oxygen supply line is also connected to the 3-way valve by means of a transfer line and restrictor. The restrictor is used to deliver an appropriate amount of oxygen to the burner from an external oxygen supply when the valve is actuated. The valve is most easily controlled through one of the actuators of the GC, so that it may be operated automatically by the GC without the need for user intervention.

The gas lines are connected to the 3-way Decoking valve as shown in Figure 1. This figure is not to scale, but it should help illustrate the gas flow paths. The 3-way Decoking valve is actually physically mounted on the rear of the Model 355 controller as shown in Figure 2.

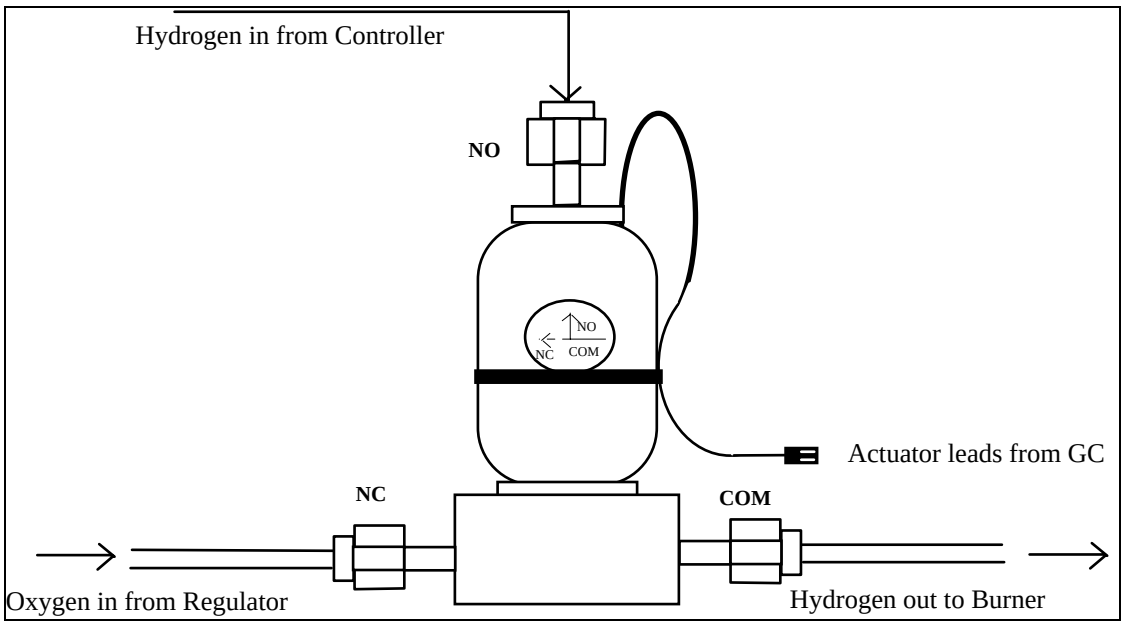

Figure 1 3-Way Decoking Valve Installation Configuration

The hydrogen path is normally open (NO) when the valve is not energized. The oxygen path is normally closed (NC) when the valve is not energized. The common port of the valve is connected to the top of the burner assembly. When the valve is energized (voltage applied) the hydrogen path is closed and the oxygen path is opened. In this manner, the environment in the burner is made very oxidative and all combustible contaminants, such as carbon, will be removed. If the valve is correctly installed, it is not physically possible for hydrogen and oxygen to mix. Ensure that the line connections are correctly attached to the valve.

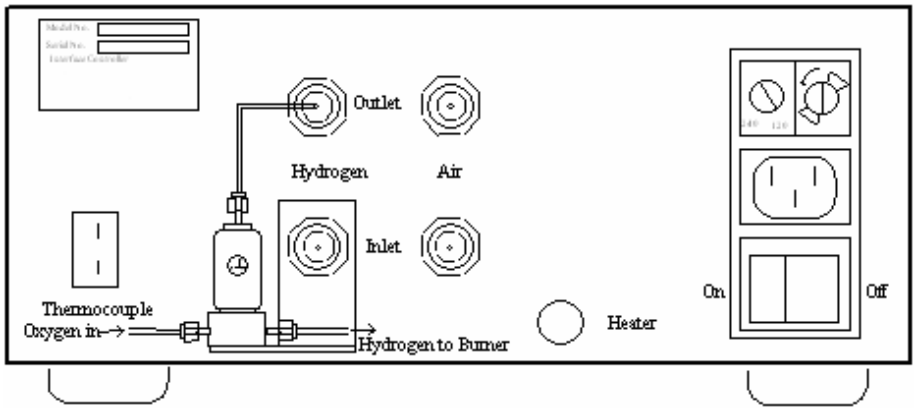

Figure 2 Interface Controller Rear Panel Showing Proper Location of Decoking Valve

Installing the 3-Way Decoking Valve Option

The following instructions assume that neither a 3-Way Decoking Valve nor a Hydrogen Shutoff Valve is attached to the 355 controller. If one of these valves is attached to the controller, remove it from the controller and start with number 4 of the instructions below.

1. First mount the valve body on the back of the controller. To do this, disconnect the hydrogen inlet and outlet tubes from the controller.
2. Remove the lid from the controller and disconnect the copper line from the hydrogen inlet bulkhead.
3. Remove the hydrogen inlet bulkhead fitting from the controller and slide it through the 5/16" hole in the mounting plate of the valve from the valve side of the plate.
4. Slide the bulkhead fitting back into the controller and secure it with the lock washer and brass nut on the inside.
5. Reconnect the copper line on the inside, replace the lid of the controller.
6. Connect the 1/16" stainless line to the hydrogen outlet and normally open (NO) port of the valve.
7. Connect the hydrogen delivery line on the top of the burner to the common (COM) port of the valve.
8. Connect the oxygen line supplied with this kit to the normally closed (NC) port of the valve and the oxygen source.
9. Connect the actuation leads of the valve to the voltage source to be used to actuate the valve, for example, a valve actuator in the GC. The valve normally supplied is a 24 VDC valve, which is common on most GCs. If you need assistance in finding the location of these actuation sources, contact the manufacturer of your GC or Agilent.

Note

Varian GC's use 24VAC valve actuators, so the valve has a rectifier in its electrical line. Improper electrical installation or use of improper voltage may damage components within the GC.

Operating the Decoking Valve Option

1. Set the flows on the Model 355 controller to their proper values, as stated in the Operation and Service Manual. Disconnect the oxygen line from the valve and turn on the oxygen source. Adjust the pressure (nominally 20-30 psig, ~2 Bar) on the regulator to obtain a flow rate of approximately 125-150 mL/min. The flow rates may also be changed by adding or removing restrictors on the oxygen line. There are normally two restrictors on this line, a 1/8" frit restrictor on the oxygen source side of the line and a 1/16" tube restrictor on the valve side of the oxygen line. Controlling the flow rate by way of pressure is much more precise.

2. Reattach the oxygen line to the solenoid valve. With the controller and burner fully operational, actuate (energize) the valve and note changes in the pressure reading on the controller. A noted difference in the pressure upon valve actuation (for example 200 Torr with hydrogen to the burner and 250 Torr with oxygen to the burner) means that the valve is functioning. With the oxygen source turned off, actuate the valve. The pressure should now be significantly lower (for example, 150 Torr instead of 250 Torr). This indicates that the flow paths are correctly installed.

3. Set the GC or data system valve driver to automatically actuate the valve. For instance, in the HP 5890 GC, a purge valve signal is conveniently used to activate the on/off valve at the end of a run. (Either one of two purge valve signals may be used). Use the purge A or B time command to shut off the hydrogen at the end of a run for two minutes. For example, if an analysis is 30 minutes long, extend the run to 32 minutes. Have the GC turn purge A (or B) off at 30.01 (this shuts off the hydrogen) and turn purge A (or B) on at 31.99 (this turns the hydrogen back on).

Notes

Some oxygen regulators are non-relieving. In the case of these types of regulators, the secondary pressure of the regulator will increase to a high value when the flow from the regular is blocked, i.e., when the valve in not actuated (de-energized). This may cause the controller to “Fault” when the valve is actuated. In this case, attach the oxygen line to the ozone “AIR INLET” to the SCD, so that there is continual bleed from the secondary of the non-relieving regulator.

A separate oxygen regulator may be required to adjust the oxygen flow rate to the solenoid valve. Alternatively, a restrictor tube or frit can also be used to accomplish this.

Stop sample integration prior to activating the valve to avoid integration of any area associated with the valve switch.

Caution

Hydrogen is a highly flammable gas. Oxygen supports vigorous combustion. Use care in handling these gases. This procedure also involves making electrical connections. Always turn off and unplug instruments to avoid the hazard of electrical shock when making such connections.

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Agilent Technologies, Inc.
2850 Centerville Road
Wilmington, DE 19808-1610
Printed in the USA Feb 2007

G6600-90023